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Revisiting Spanopoula islet: *Podarcis erhardii* (Bedriaga, 1886) population thriving 45 years after first recorded

Chloe Adamopoulou[1], Eirini Linardaki[2], Evanthia Thanou[3]

1 *Section of Zoology-Marine Biology, Department of Biology, National and Kapodistrian University of Athens, Panepistimiopolis, 15701 Athens, Greece*
2 *Zacharitsa 1-3, 13451, Athens, Greece*
3 *Molecular Ecology Backshop, G. Lekka 16, 20300, Loutraki Korinthia, Greece*

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Corresponding author: Chloe Adamopoulou (cadam@biol.uoa.gr)

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Abstract

The Erhard's wall lizard *Podarcis erhardii* (Bedriaga, 1886) was first recorded on the tiny rocky islet of Spanopoula, near Kea (Aegean Archipelago, Greece), in 1980. Since then, there has been no other published reference to confirm the species' presence or to estimate its population status. Here, we report on a herpetological survey we carried out on Spanopoula 44 years later, which added a third species (*Mediodactylus kotschyi*) to the islet's herpetofauna list. During our visit, we collected body-size measurements and tissue samples for the molecular identification of the *Podarcis* lizards inhabiting the islet. We found a thriving population of medium-sized wall lizards, belonging to the mainland form, *P. erhardii livadiacus* (Werner, 1902). As this subspecies is not present in adjacent Kea and nearby islands, our finding supports a human-mediated dispersal scenario.

Key Words

Aegean Archipelago, body size, islet, Lacertidae, Mediterranean, molecular identification

Introduction

On 13 June 2024, we (CA and EL) made a one-day visit to Spanopoula, a rocky limestone islet located less than 120 m off the north coast of Kea Island (Aegean Archipelago, Greece) (Fig. 1A–C). The aim of the trip was to confirm the presence of the Erhard's wall lizard, *Podarcis erhardii*. The most recent record of the species dates back 45 years, to 1980, when Grillitsch and Tiedemann visited the islet during a herpetological expedition on Greek islands and recorded the species for the first time (Grillitsch and Tiedemann 1984). *Podarcis erhardii*, the most widespread lizard species in the Aegean, is present in all adjacent Cycladic islands (Kithnos, Serifos, Andros, Tinos, Syros) but surprisingly is absent from Kea (Grillitsch and Tiedemann 1984; Pafilis and Maragkou 2020).

Spanopoula (37°41'1.38"N, 24°22'23.16"E) is a tiny islet (area ~0.02 km^2), separated from the neighboring Kea Island by relatively shallow waters (~5–10 m). Boats cannot moor on Spanopoula, so landing on the islet requires swimming and climbing. We reached the islet at 11:00 hours, and upon our arrival, the first thing we noticed was a flourishing breeding colony of the yellow-legged gull (*Larus michahellis*). Apart from *P. erhardii*, we recorded *Chalcides ocellatus* (1 ind.) and *Mediodactylus kotschyi* (1 ind.), both under rocks. Kotschy's gecko (*M. kotschyi*) is reported for the first time from Spanopoula islet. The only report on the island's herpetofauna comes from Grillitsch and Tiedemann (1984), who report *Podarcis erhardii* ssp. and *Chalcides ocellatus ocellatus* as the only reptilian inhabitants. Moreover, we found signs indicating the presence of rats (*Rattus* spp.).

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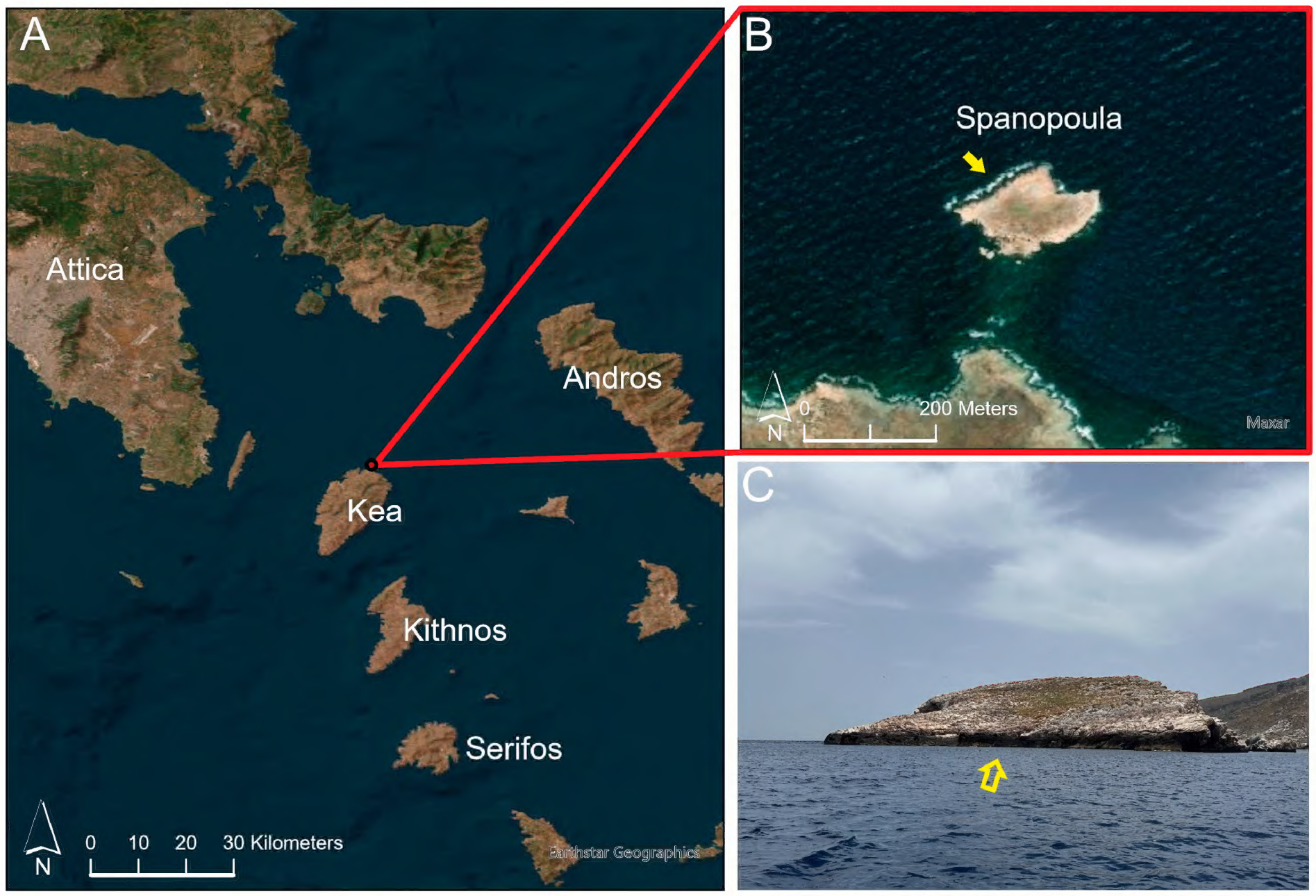

Figure 1. A. Part of the central Aegean Archipelago. The red dot points to Spanopoula islet; **B.** Enlarged map of the area showing Spanopoula and the adjacent coast of Kea; **C.** Picture of Spanopoula islet (yellow arrow indicates the NW coast).

Podarcis lizards were almost exclusively seen on the upper third of the islet, that is, towards its highest point (NE shore), which is characterized by increasing altitude (up to 20 m) and the presence of caper bushes (*Capparis spinosa*), which is the dominant vegetation on the islet. During our visit, we caught six lizards using the "fishing" technique with Tenebrio larvae as bait. Upon catching a lizard, we measured SVL using a digital caliper to the nearest 0.1 mm, took a small tail tip tissue for genetic analyses, and released the lizard at the same location. On Spanopoula, *P. erhardii* proved to be medium-sized lizards based on our measurements and overall observations. Adult males measured 64, 60, and 65 mm (mean SVL = 63 ± 6.57 95%CI, n = 3), adult females 60, 62, and 65 mm (mean SVL = 62.33 ± 6.25 95%C, n = 3), and for all individuals considered mean SVL = 62.67 ± 2.46 95%CI, n = 6. None of the females were carrying oviductal eggs. All the captured individuals had mites around their hind limbs and intact tails (83%), except for one female. All adult males had orange abdomens. We did not encounter any malformed animals.

DNA was extracted from the collected tail tips, and the mitochondrial marker cytochrome b (cytb) was PCR-amplified and sequenced as in Poulakakis et al. (2003). The resulting cytb sequences were aligned with other available sequences, and a maximum likelihood tree was constructed with the online server IQtree (Trifinopoulos et al. 2016) to test the placement of lizards from Spanopoula within the known *P. erhardii* maternal phylogeny. Two previously undetected haplotypes (GenBank Accession Numbers PV399864 and PV399865) differing from each other by a single mutation were found in Spanopoula. These were placed within a clade grouping lizards from western Attica, northeastern Peloponnese, and Evvoia Island, with very high bootstrap support (99%). As expected, the *Podarcis erhardii* population of Spanopoula seems to be the result of a human-induced dispersal. The Cyclades islands host a genetically differentiated lineage (Psonis et al. 2021) and are thus excluded as the source of the Spanopoula population. Our results suggest that this population belongs to the mainland form of *P. erhardii livadiacus* (Werner, 1902) (Fig. 2), which is considered a valid subspecies (Sindaco and Jeremcenko 2008), distributed in Evvoia and NE Peloponnese, and has been recently reported from the Attika peninsula (Mt. Parnitha) and adjacent islets (Ag. Georgios and the Prasonisi islet very close to Salamina island) (Pafilis and Maragkou 2020). However, representative sequences from eastern Attica or these insular populations are not available, and the exact source of the human-induced population of Spanopoula cannot be traced.

The *P. erhardii* population of Spanopoula is isolated on a literally tiny rock. Lizards are limited to an even smaller (perimeter < 300 m) vegetated area, yet very rich in organic material. An estimate of about two hundred individuals can be made considering the extent of the

Figure 2. *Podarcis erhardii livadiacus* (Werner 1902) on Spanopoula islet (Aegean Archipelago).

available habitat and the number of observed lizards associated with the caper plants. Lizards were seen wandering inside the plants or at their edges. Caper bushes seem to be the main shelter for lizards, as they offer protection from adverse weather conditions (e.g., strong north winds), safe thermoregulation spots among their sparse branches, and plenty of food. In arid insular ecosystems of the Aegean, available shrubs have been observed to provide such "services" to lizards (Adamopoulou and Valakos 2005). In addition, we recorded several other "food islands" consisting of seabird fecal material, carcasses of juvenile seagulls and chicks, and their associated rich arthropod fauna, which can easily come from adjacent Kea. Nonetheless, the presence of marine subsidies and rich organic matter does not seem to drive a large body size in these lizards, unlike other populations of *Podarcis* (e.g., *P. gaigeae*, Pafilis et al. 2009). Individuals of the Spanopoula population are medium-sized, which comes as a surprise considering that a pattern for larger body size is usually seen in *P. erhardii* populations of small islands. For example, on the southeastern Aegean islet of Plakida (0.52 km^2), *P. erhardii* reaches up to 81 mm in SVL (mean size 72.6 mm, Itescu et al. 2021). The recent colonization of Spanopoula from a medium-sized mainland population explains their body-size deviation from the commonly found insular pattern of gigantism. This population could actually serve as a good model for future field studies to address the long-term effect that local adaptation to an insular environment may have on the body size of *Podarcis* lizards.

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References

Adamopoulou C, Valakos ED (2005) Thermal ecology and activity cycle of *Podarcis milensis* in a sandy coastal area. Israel Journal of Zoology 51: 39–52. https://doi.org/10.1560/HWWQ-R26Y-WTHB-K00V

Grillitsch H, Tiedemann F (1984) Zur Herpetofauna der griechischen Inseln Kea, Spanopoula, Kithnos, Sifnos, Kitriani (Cycladen), Alonissos und Piperi (Nördliche Sporaden). Annalen des Naturhistorischen Museums in Wien 86B: 7–28.

Itescu Y, Foufopoulos J, Schwarz R, Lymberakis P, Slavenko A, Gavrilidi IA, Meiri S, Pafilis P (2021) The island of extremes: Giants and dwarfs on a small remote island. Russian Journal of Herpetology 28(4): 225–230. https://doi.org/10.30906/1026-2296-2021-28-4-225-230

Pafilis P, Meiri S, Foufopoulos J, Valakos ED (2009) Intraspecific competition and high food availability are associated with insular gigantism in a lizard. Naturwissenschaften 96(9): 1107–1113. https://doi.org/10.1007/s00114-009-0564-3

Pafilis P, Maragkou P [Ed.] (2020) Atlas of the Amphibians and Reptiles of Greece. Broken Hill, Nicosia, 231 pp.

Poulakakis N, Lymberakis P, Antoniou A, Chalkia D, Zouros E, Mylonas M, Valakos ED (2003) Molecular phylogeny and biogeography of the wall-lizard *Podarcis erhardii* (Squamata: Lacertidae). Molecular Phylogenetics and Evolution 28: 38–46. https://doi.org/10.1016/s1055-7903(03)00037-x

Psonis N, Antoniou A, Karameta E, Darriba D, Stamatakis A, Lymberakis P, Poulakakis N (2021) The wall lizards of the Balkan peninsula: Tackling questions at the interface of phylogenomics and population genomics. Molecular Phylogenetics and Evolution 159: 107–121. https://doi.org/10.1016/j.ympev.2021.107121

Sindaco R, Jeremchenko V (2008) The reptiles of the Western Palearctic. 1. Annotated checklist and distributional atlas of the turtles, crocodiles, amphisbaenians and lizards of Europe, North Africa, Middle East and Central Asia. Monografie della Societas Herpetologica Italica (Pbs) I. Edizioni Belvedere, Latina, 544 pp.

Trifinopoulos J, Nguyen LT, von Haeseler A, Minh BQ (2016) W-IQ-TREE: a fast online phylogenetic tool for maximum likelihood analysis. Nucleic Acids Research 44: 232–235. https://doi.org/10.1093/nar/gkw256